ABSTRACT

A method for operating an electrolyzer to produce metal particles by electrolysis of an electrolyte solution while optimizing electrolyzer service life and particle quality. An electrolyzer immersed in a body of electrolyte including dissolved metal is energized by a power supply and cell voltage across an anode and cathode is monitored. Power supply output is adjusted responsive to the monitored voltage to maintain current density within a preferred range to promote high-quality particle growth. In a growth cycle, particles fully grown are removed from the cathode, and cell voltage polarity is reversed to dissolve unremoved particles. Peak cathode current may be monitored during polarity reversal to indicate a cathode surface condition, and the surface reconditioned if peak current exceeds an operating limit.